SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-48

Name: Murdo Lake **County:** Jones
Legal Description: T1S-R28E-Sec. 36 **GPS:** 43°54'57.63"N 100°42'46.10"W
Location from nearest town: 2 miles north of Murdo

Date of present survey: July 6-8, 2015 (netting), June 8, 2015 & September 29, 2015 (electrofishing)
Date of last survey: June 18-20, 2012 (netting), October 2, 2012 (electrofishing)
Most recent lake management plan: F-21-R-38 (January 1, 2006 to December 31, 2010)
Management classification: Warmwater Permanent

Primary Game Species	Secondary and Other Species
Largemouth Bass	Yellow Perch
Black Crappie	Walleye
Black Bullhead	

PHYSICAL DATA

Surface Area: 41 acres **Watershed:** 4,420 acres
Maximum Depth: 28 feet **Mean Depth:** 8.9 feet
Lake elevation at time of survey (field observations): Full
Contour map: Yes **Date:** 1992

Ownership of lake and adjacent lakeshore properties:

Murdo Lake, also known as Murdo Dam and Murdo North Dam, is a 41-acre artificial impoundment located two miles north of the City of Murdo in central Jones County. The lake was created in 1938 when the Works Project Administration (WPA) constructed an earthen dam on a tributary to the upper portion of White Clay Creek. The lake was constructed to provide a primary water source for the city. The City of Murdo owns 640 acres of land containing the dam grade and the lake. The Wildlife Division of the South Dakota Department of Game, Fish and Parks completes fisheries management activities at Murdo Lake.

Watershed condition with percentages of land use types:

The watershed for Murdo Lake is approximately 6.9 square miles or 4,420 acres, which is nearly entirely privately owned agricultural and grassland. Land use in the watershed is 67% native grasses used for livestock grazing, hay production and Conservation Reserve acres. The remaining 33% is cultivated cropland. The immediate shoreline is 100% non-grazed native grasses.

Fishing access:

Heavy amounts of submergent and emergent vegetation surround the entire shoreline and restrict shore fishing in open water periods. There is a good plank boat ramp for water access via boat. There is ample opportunity for ice fishing.

Condition of all structures (i.e. spillway, boat ramps, level regulators, etc.):

The City of Murdo constructed a new boat ramp on the northwest corner of the lake. The spillway, dam grade, boat dock and old boat ramp are all in good condition. There is an outdoor toilet and a picnic shelter.

Field observations of aquatic vegetation condition:

Heavy amounts of submergent vegetation are found throughout the lake to a depth of around 5 feet. The main species of submergent vegetation is common milfoil and sago pondweed. Emergent vegetation is found along 90% of the shoreline with cattails and rushes being the main species.

CHEMICAL DATA

Field observations of water quality and pollution problems:

No pollution problems were apparent at the time of the survey. The water clarity was good with a secchi disc reading of 4.5 feet. Other water quality characteristics were measured in the field on July 6, 2015, using a HACH water quality kit and a Hanna multiparameter meter. Results are found in Table 1.

Presence of a thermocline and depth from surface: No
Station for water chemistry located on attached map: Yes

Table 1. Water chemistry results from Murdo Lake, Jones County, July 6, 2015.

Station	Depth (ft)	Temp (F)	DO (ppm)	CO2 (ppm)	ALK (mg/L)	HRD (mg/L)	pH	Cond. (µS/cm)	TDS (ppm)	Sal.	ORP	Secchi (ft)
A	Surface	77.1	4.46	23.2	181	549	8.82	1847	924	0.94	-177.9	4.5
A	26.5	77.6	2.44	33.2	173	547	8.52	1852	926	0.94	-186.2	

BIOLOGICAL DATA

Methods:

Murdo Lake was sampled on July 6-8, 2015, with ten overnight trap net sets. The trap nets have 3ft x 5ft frames, 60ft leads, and ¾ inch knotted mesh. No overnight gill net sets were done during this survey period. On the evening of June 8, 2015, Murdo Lake was electrofished for 60 minutes (6-ten minute transects) to sample the spring largemouth bass population. The boat was set up with 120 pulses per second of DC current at 120 volts with around 35 amps to electrofish the lake that had a conductivity of 1,945µS/cm with a water temperature of 71.0°F. On the evening of September 29, 2015, Murdo Lake was electrofished for 60 minutes (6-ten minute transects) to sample the largemouth bass population. The boat was set up with 120 pulses per second of DC current at 340 volts with around 20 amps to electrofish the lake that had a conductivity of 1,918µS/cm with a water temperature of 65.2°F. Fish indices and statistics were completed using Winfin.

Results and Discussion:

Trap Net Catch

Table 2. Total catch of ten, overnight ¾-inch frame nets at Murdo Lake, Jones County, July 6-8, 2015.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Bluegill	246	40.6	24.6	± 14.9	5.2	32	5	105
Black Bullhead	169	27.9	16.9	± 6.1	58.3	97	14	85
Black Crappie	127	20.9	12.7	± 6.3	17.7	4	0	103
Yellow Perch	60	9.9	6.0	± 2.3	4.6	59	12	87
Largemouth Bass	4	0.7	0.4	± 0.3	0.2	--	--	105

* Twelve year mean (1974, 1977, 1981, 1987, 1994, 1998, 2001, 2002, 2003, 2006, 2009, 2012)

Electrofishing Catch

Table 3. Total catch from six ten minute transects of fall nighttime electrofishing at Murdo Lake, Jones County, September 29, 2015.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	326	100	326.0	± 53.3	199.7	33	27	103

* Three year mean (2006, 2009, 2012)

Table 4. Total catch from six ten minute transects of summer nighttime electrofishing at Murdo Lake, Jones County, June 8, 2015.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Largemouth Bass	63	100	63.0	± 16.1	0.0	97	62	98

* First summer sample (2015)

Black Crappie

Black crappie numbers have remained relatively constant over the last three surveys. The CPUE of 12.7 is right on with the 12.8 from the 2012 survey (Table 11) but slightly below the 17.7 twelve year mean of 17.7 (Table 2). Size structure has dropped the last three surveys. The current PSD is 4 with an RSD-P of 0 compared to the 82 and 18, respectively, from the 2012 survey. Figures 1 through 8 illustrate the length frequency histograms for the last eight surveys and show the fluctuating size structure. Growth continues to be slow with means below statewide, regional and SLI means (Table 5). Condition is good with a mean Wr of 103.

Table 5. Average back-calculated lengths (mm) for each age class of black crappie in Murdo Lake, Jones County, 2015.

			Back-calculated Age					
Year Class	Age	N	1	2	3	4	5	6
2013	2	11	63	118				
2012	3	25	69	108	146			
2011	4	65	72	105	124	159		
2010	5	6	67	95	111	142	177	
2009	6	1	74	102	136	161	178	190
All Classes		**108**	**69**	**106**	**129**	**154**	**178**	**190**
Statewide Mean			83	147	195	229	249	
Region II Mean			75	132	177	209	235	
SLI* Mean			78	134	180	209		

* Small Lakes and Impoundments

Figure 1. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 2015.

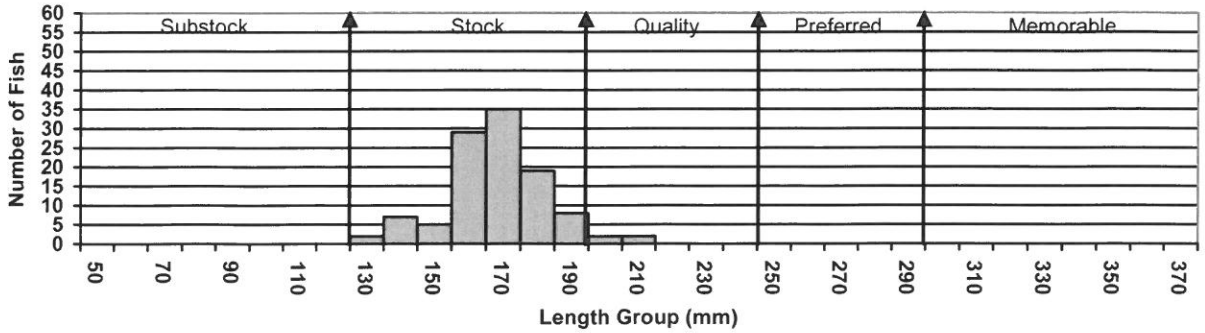


Figure 2. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 2012.

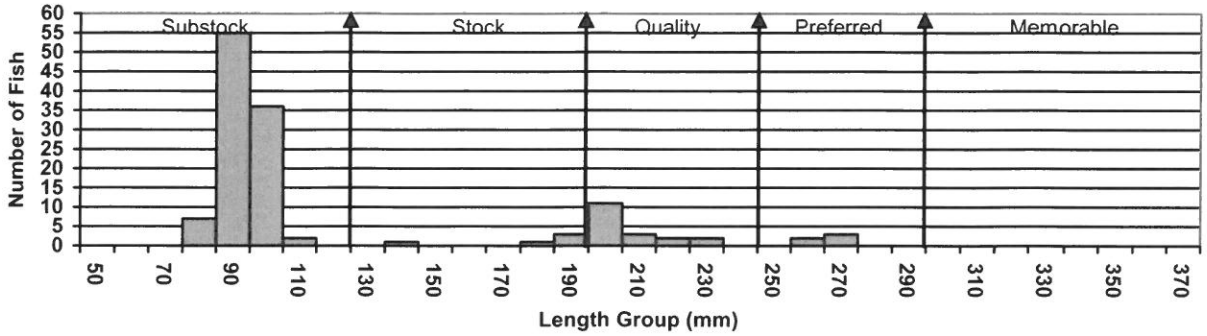


Figure 3. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 2009.

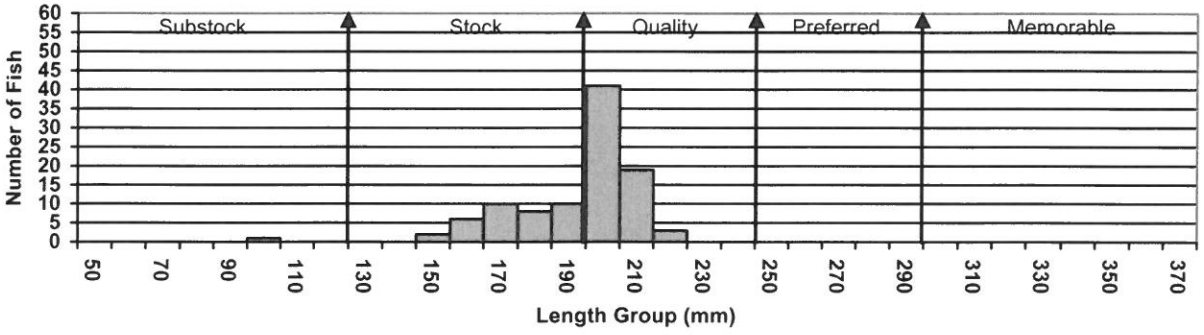


Figure 4. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 2006.

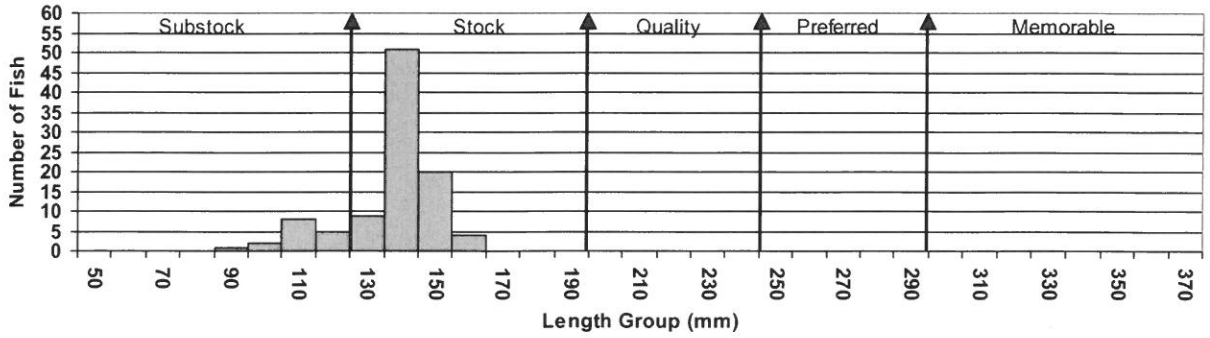


Figure 5. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 2003.

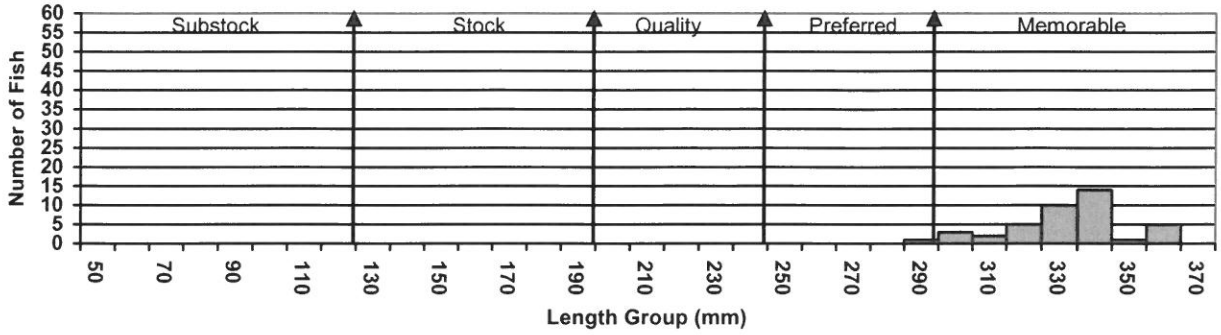


Figure 6. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 2002.

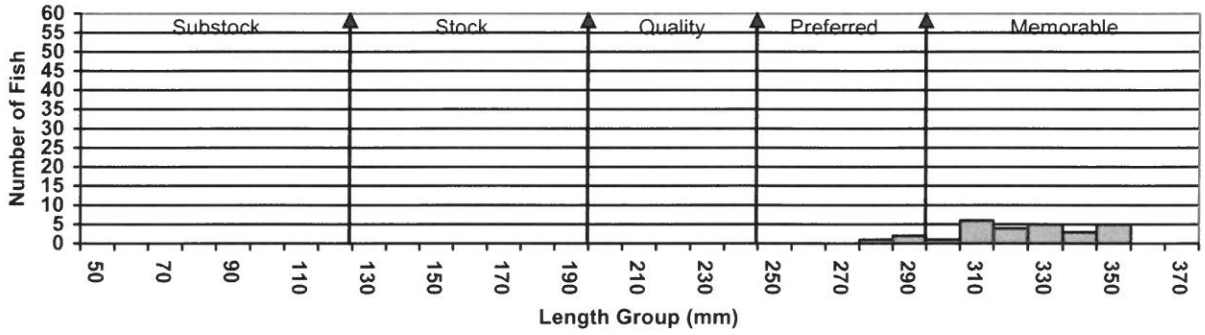


Figure 7. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 2001.

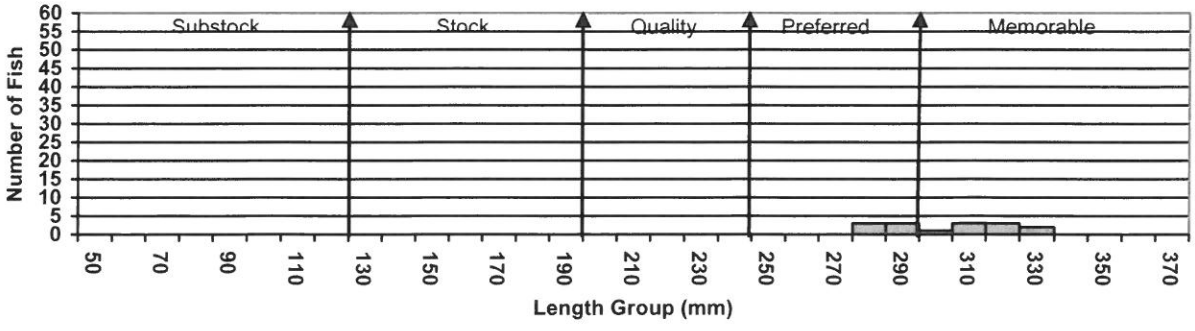
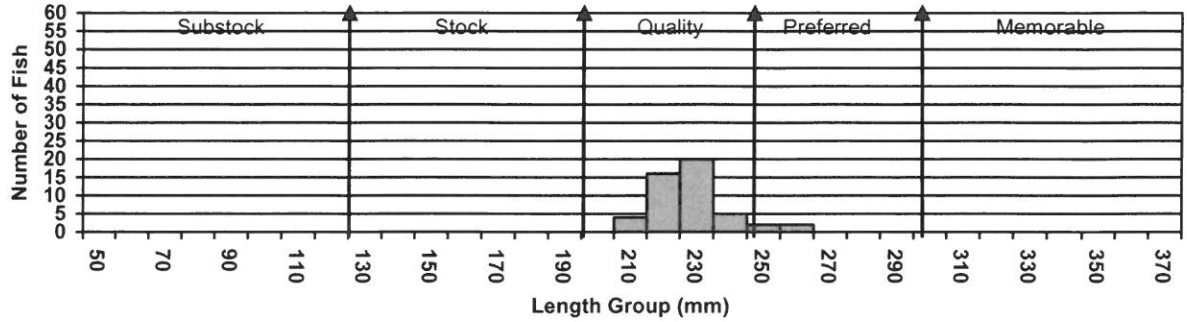


Figure 8. Length frequency histogram for black crappie sampled in Murdo Lake, Jones County, 1998.



Largemouth Bass

Murdo Lake appears to be holding onto its largemouth bass population and it is transforming into a quality population. The population was sampled twice this survey season, an early summer and a normal fall sample, due to a request for some early info about the population. The summer CPUE was 63.0 bass per hour of electrofishing. The fall CPUE was 326.0 bass per hour of electrofishing, which is well below the 469.0 from the 2012 survey (Table 11), but well above the 199.7 three year mean (Table 3). It was interesting to see the difference in density and size structure between the two sampling dates. Figures 9 and 10 illustrate the length frequency histograms for the fish sampled between the two events this season. Then adding Figures 11 through 13 illustrate the length frequency histograms for the last four surveys. PSD was 97 with an RSD-P of 62 in the summer compared to the PSD of 33 with an RSD-P of 27 in the fall. Growth is good for both sampling events with means right on to above statewide, regional and SLI means (Tables 6 and 7). Condition is also good with a mean Wr of 103 from the fall and 98 from the summer.

Table 6. Average back-calculated lengths (mm) for each age class of largemouth bass sampled from Murdo Lake, Jones County, Summer 2015.

			Back-calculated Age								
Year Class	Age	N	1	2	3	4	5	6	7	8	9
2013	2	1	99	239							
2011	4	7	104	145	226	316					
2010	5	13	101	176	274	323	372				
2009	6	13	105	203	315	370	398	419			
2008	7	3	88	163	267	350	389	410	431		
2007	8	1	92	192	311	397	450	485	497	506	
2006	9	1	108	217	268	322	413	446	463	470	479
All Classes		**39**	**99**	**191**	**277**	**346**	**404**	**440**	**464**	**488**	**479**
Statewide Mean			96	182	250	305	342				
Region II Mean			105	183	246	296	328				
SLI* Mean			99	183	246	299	332				

* Small Lakes and Impoundments

Table 7. Average back-calculated lengths (mm) for each age class of largemouth bass sampled from Murdo Lake, Jones County, Fall 2015.

			Back-calculated Age						
Year Class	Age	N	1	2	3	4	5	6	7
2015	0	15							
2014	1	87	95						
2013	2	2	100	187					
2012	3	1	134	235	326				
2011	4	9	124	198	279	350			
2010	5	8	104	216	332	384	414		
2009	6	4	116	224	335	387	428	445	
2008	7	1	98	202	327	416	462	491	500
All Classes		**127**	**110**	**210**	**320**	**384**	**434**	**468**	**500**
Statewide Mean			96	182	250	305	342		
Region II Mean			105	183	246	296	328		
SLI* Mean			99	183	246	299	332		

* Small Lakes and Impoundments

Figure 9. Length frequency histogram for largemouth bass sampled from Murdo Lake, Jones County, Summer 2015.

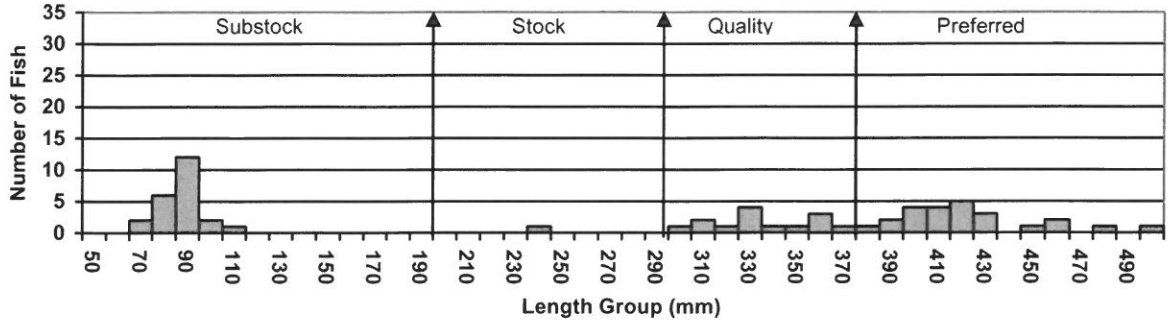


Figure 10. Length frequency histogram for largemouth bass sampled from Murdo Lake, Jones County, Fall 2015.

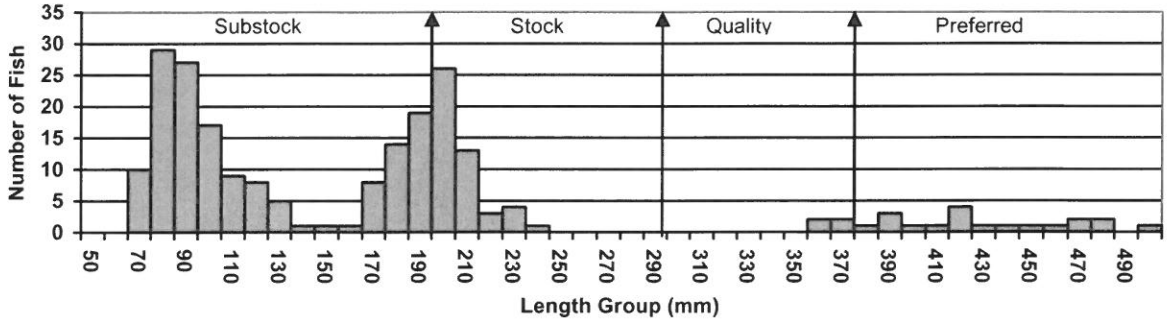


Figure 11. Length frequency histogram for largemouth bass sampled from Murdo Lake, Jones County, 2012.

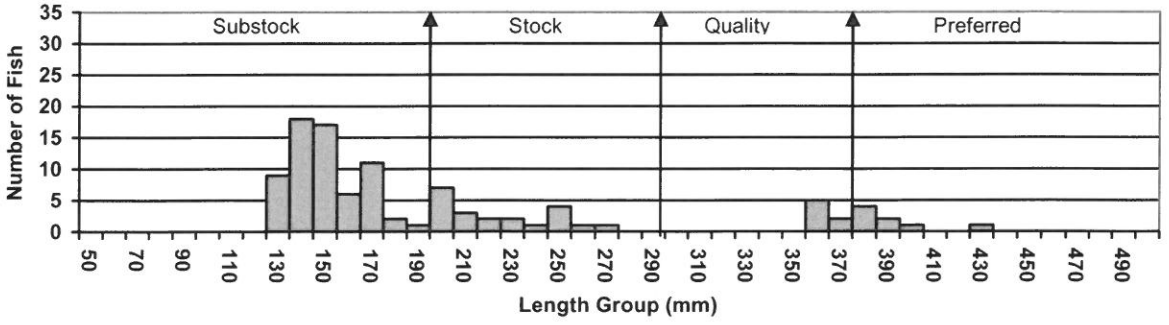


Figure 12. Length frequency histogram for largemouth bass sampled from Murdo Lake, Jones County, 2009.

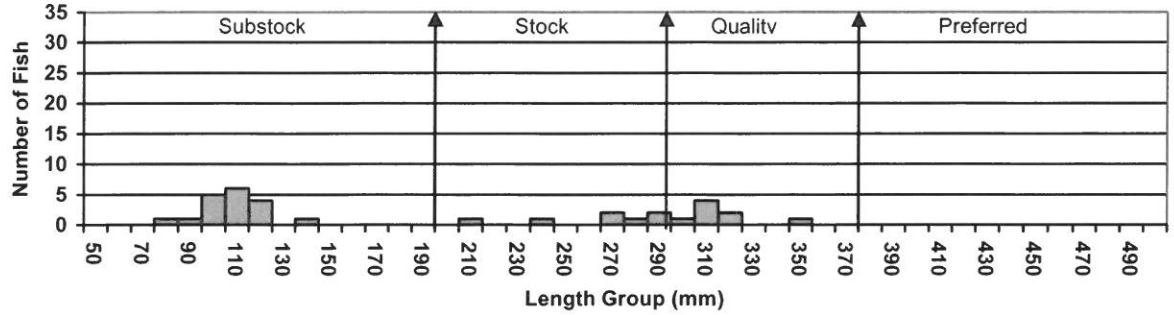
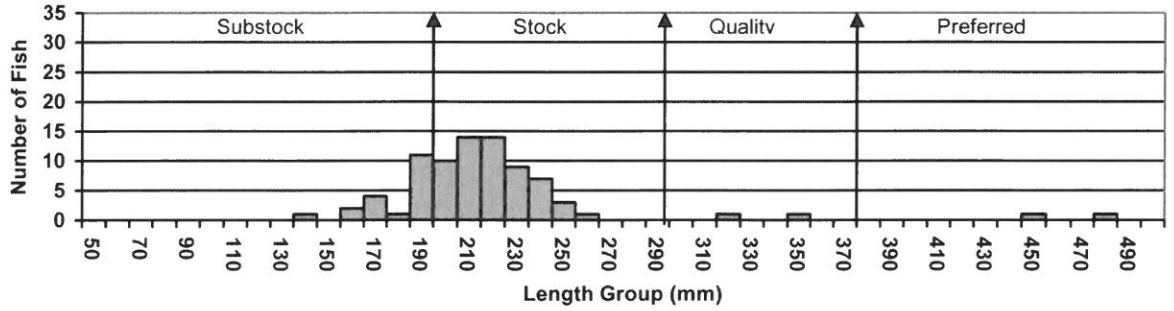


Figure 13. Length frequency histogram for largemouth bass sampled from Murdo Lake, Jones County, 2006.



Black Bullhead

Black bullhead numbers have increased from the 2012 survey. The CPUE of 16.9 is well above the 5.2 from the 2012 survey (Table 11), but well below the 58.3 twelve year mean (Table 2). Size structure has remained constant over the past two surveys with the current PSD of 97 with an RSD-P of 14 compared to the 94 and 27, respectively, from the 2012 survey. Figures 14 through 21 illustrate the length frequency histograms for the fish sampled over the past eight surveys. Condition is fine with a mean Wr of 85.

Figure 14. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones, County, 2015.

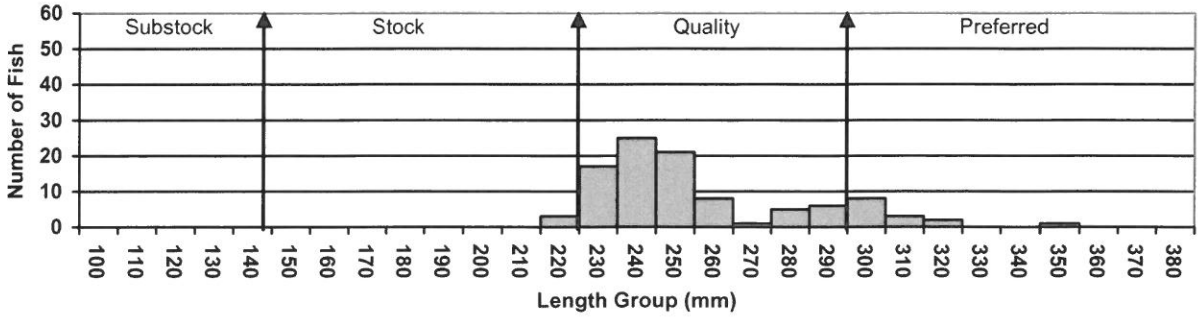


Figure 15. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones, County, 2012.

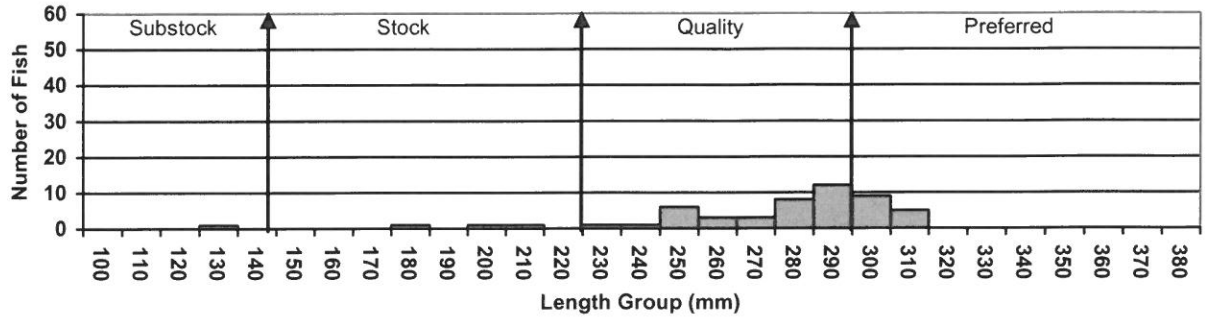


Figure 16. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones, County, 2009.

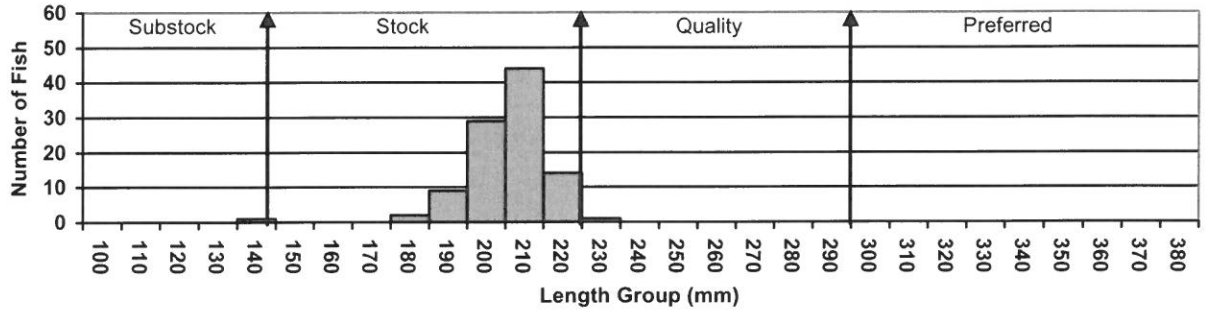


Figure 17. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones, County, 2006.

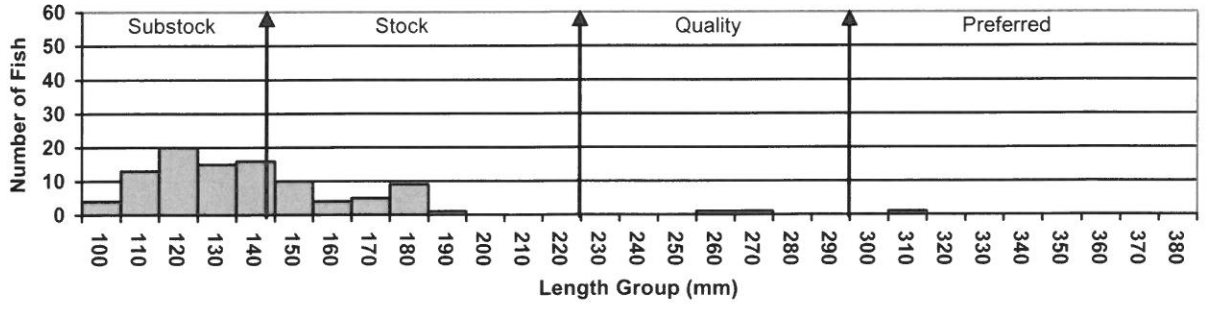


Figure 18. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones, County, 2003.

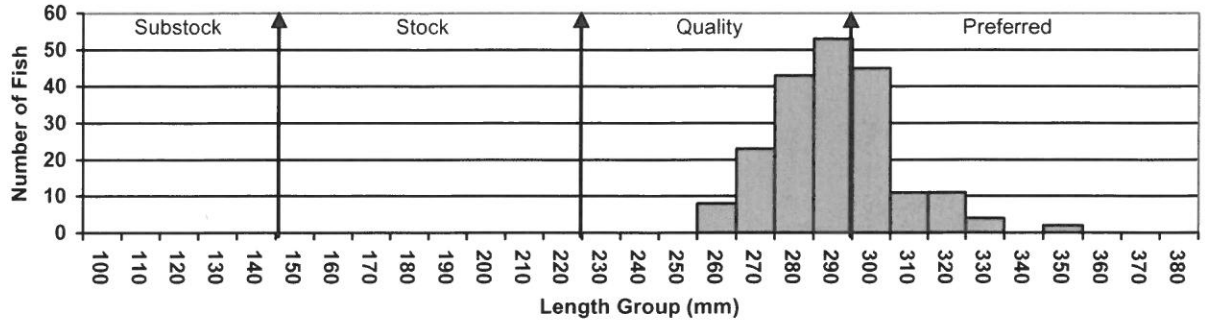


Figure 19. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones County, 2002.

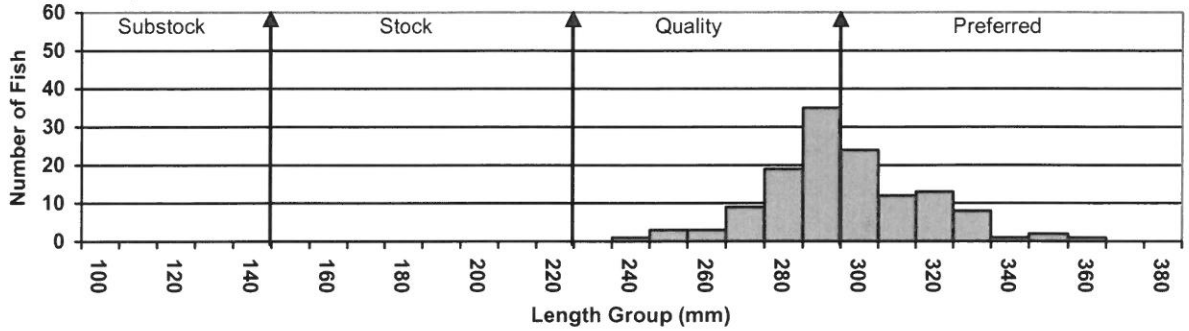


Figure 20. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones County, 2001.

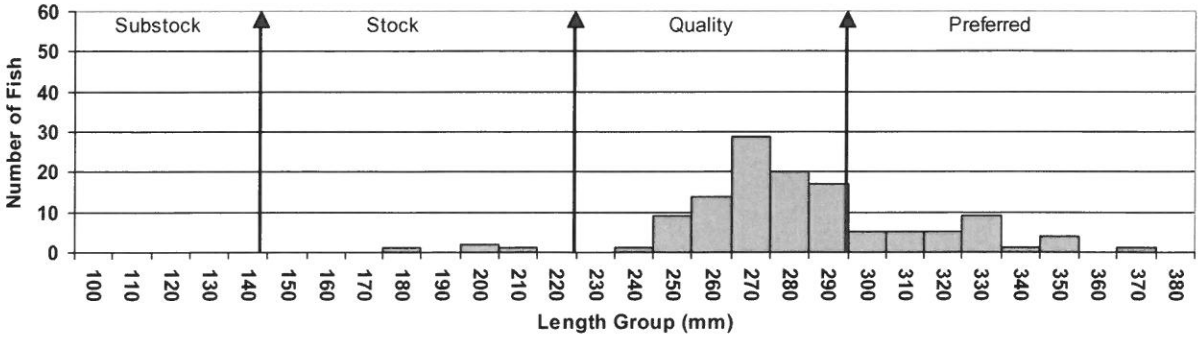
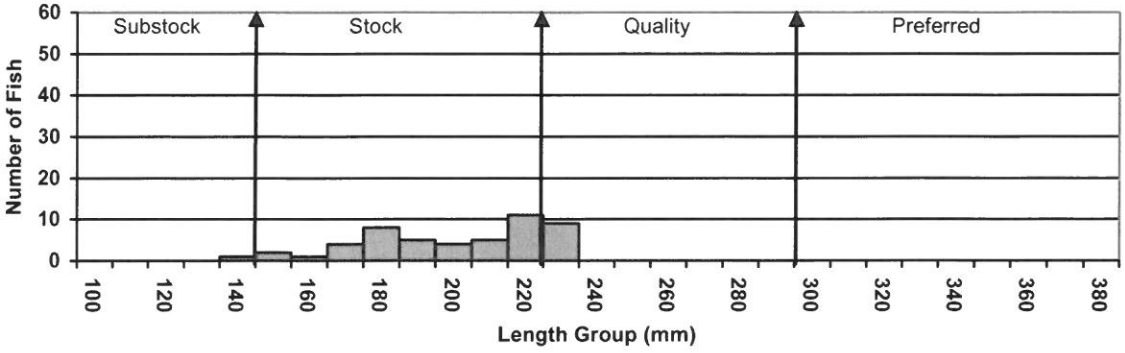


Figure 21. Length frequency histogram for black bullhead sampled in Murdo Lake, Jones County, 1998.



Bluegill

Bluegills have become the dominant panfish species present in Murdo Lake. The CPUE of 24.6 is well above the 2.8 from the 2012 survey (Table 11) as well as the 5.2 twelve year mean (Table 2). Size structure is dominated by small fish as can be seen with the PSD of 32 and RSD-P of 5. Figure 22 also shows the population being dominated by small fish in show the length frequency histogram of the fish sampled this survey. Figure 23 is the comparison to the fish sampled in the 2012 survey. Growth is good with means right on with statewide, regional and SLI means (Table 8). Condition is also good with a mean Wr of 105.

Table 8. Average back-calculated lengths (mm) for each age class of bluegill sampled from Murdo Lake, Jones County, 2015.

			Back-calculated Age					
Year Class	Age	N	1	2	3	4	5	6
2013	2	59	49	105				
2012	3	29	51	116	147			
2011	4	9	44	108	167	186		
2010	5	2	46	115	167	185	202	
2009	6	1	53	137	151	170	183	204
All Classes		**100**	**49**	**116**	**158**	**180**	**192**	**204**
Statewide Mean			55	103	141	166	180	
Region II Mean			52	97	134	164	180	
SLI* Mean			53	101	138	163	180	

*Small Lakes and Impoundments

Figure 22. Length frequency histogram for bluegill sampled in Murdo Lake, Jones County, 2015.

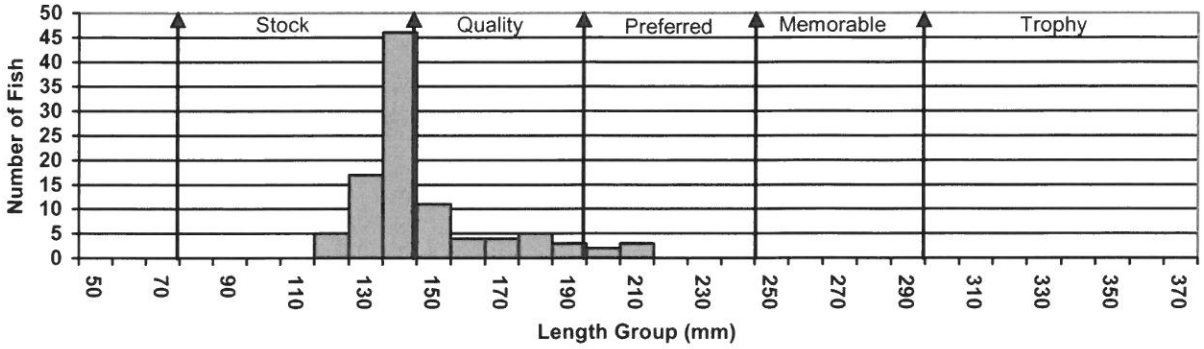
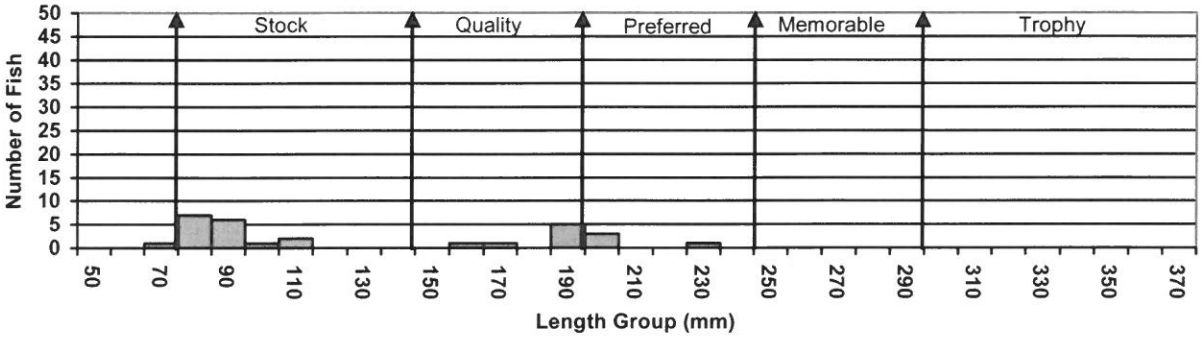


Figure 23. Length frequency histogram for bluegill sampled in Murdo Lake, Jones County, 2012.



Yellow Perch

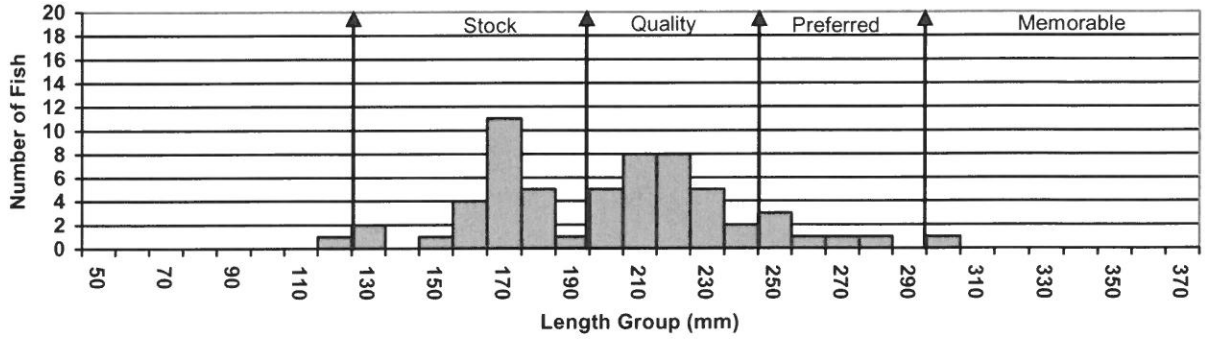
A decent yellow perch population has popped up in Murdo Lake this survey. The CPUE of 6.0 is above the 0.4 from the 2012 survey (Table 11) but just slightly above the 4.6 twelve year mean (Table 2). Figure 24 illustrates the length frequency histogram for the fish sampled this survey. Growth is good with means right on with statewide, regional and SLI means (Table 9). Condition is fine with a mean Wr of 87.

Table 9. Average back-calculated lengths (mm) for each age class of yellow perch sampled from Murdo Lake, Jones County, 2015.

			Back-calculated Age					
Year Class	Age	N	1	2	3	4	5	6
2014	1	3	99					
2013	2	21	92	150				
2012	3	28	95	172	209			
2011	4	7	115	194	229	244		
2009	6	1	132	177	209	226	240	253
All Classes		**60**	**107**	**173**	**216**	**235**	**240**	**253**
Statewide Mean			86	145	190	220	242	
Region II Mean			91	152	196	219	242	
SLI* Mean			87	142	185	205	219	

*Small Lakes and Impoundments

Figure 24. Length frequency histogram for yellow perch sampled in Murdo Lake, Jones County, 2015.



Other Species

Northern pike, walleye, smallmouth bass, green sunfish, golden shiner and rock bass were the species not sampled this survey that have been in surveys past (Table 11).

Table 10. Stockings records from 2001 to present for Murdo Lake, Jones County.

Year	Number	Species	Size
2001	169	Largemouth Bass	Adult
2001	14,100	Largemouth Bass	Fingerling
2001	2,500	Walleye	Fingerling
2001	104	Black Crappie	Adult
2001	51	Largemouth Bass	Adult
2002	80	Largemouth Bass	Adult
2004	161	Largemouth Bass	Juvenile
2004	10,050	Largemouth Bass	Fingerling
2005	750	Smallmouth Bass	Fingerling
2005	8,550	Largemouth Bass	Fingerling
2006	8,480	Largemouth Bass	Fingerling
2012	100	Smallmouth Bass	Juvenile

RECOMMENDATIONS

1. Resurvey in 2018 to monitor the fish populations.

Table 11. Gill net (GN), trap net (TN) and electrofishing (EF) CPUE for all fish species sampled in Murdo Lake, Jones County, since 1974.

Species	1974	1977	1981	1987	1994	1998	2001	2002	2003	2006	2009	2012	2015
BLB (GN)	--	1.0	3.0	37.0	34.0	--	29.0	--	60.5	--	--	--	--
BLB (TN)	--	0.1	1.3	3.0	9.0	31.4	6.6	33.4	29.2	497.5	82.8	5.2	16.9
BLC (GN)	1.5	--	--	--	33.0	--	--	--	0.5	--	--	--	--
BLC (TN)	12.5	11.1	2.4	16.6	7.0	7.4	1.5	2.7	4.1	120.2	14.4	12.8	12.7
YEP (GN)	3.0	205.0	31.0	26.0	102.0	--	--	--	--	--	--	--	--
YEP (TN)	1.0	18.5	5.1	18.0	8.0	3.9	0.1	--	0.1	--	--	0.4	6.0
LMB (EF)	--	--	--	--	--	--	--	--	0.0	97.2	33.0	469.0	326.0
LMB (SEF)	--	--	--	--	--	--	--	--	--	--	--	--	63.0
LMB (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--
LMB (TN)	0.3	0.1	0.3	0.3	--	--	--	0.2	--	--	0.2	1.4	0.4
NOP (GN)	0.5	--	6.0	--	2.0	--	--	--	--	--	--	--	--
NOP (TN)	--	0.4	0.1	0.2	--	0.1	--	--	--	--	--	--	--
WAE (GN)	0.5	--	--	--	--	--	--	--	--	--	--	--	--
WAE (TN)	--	--	--	--	--	--	--	--	--	--	--	--	--
BLG (GN)	--	--	1.0	--	--	--	--	--	--	--	--	--	--
BLG (TN)	2.5	9.1	21.1	4.0	4.0	7.1	--	--	--	--	--	2.8	24.6
SMB (EF)	--	--	--	--	--	--	--	--	--	7.2	--	--	--
SMB (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--
SMB (TN)	--	--	0.1	--	--	--	--	--	--	0.4	--	--	--
GSF (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--
GSF (TN)	--	--	2.3	0.2	--	--	0.2	--	--	--	--	--	--
GOS (GN)	0.5	--	--	--	--	--	--	--	--	--	--	--	--
GOS (TN)	--	--	--	--	--	0.7	2.7	0.6	2.3	0.5	0.1	0.1	--
ROB (GN)	--	--	--	--	--	--	--	--	--	--	--	--	--
ROB (TN)	--	--	--	--	1.0	--	--	--	--	--	--	--	--

BLB-Black Bullhead, BLC-Black Crappie, YEP-Yellow Perch, LMB-Largemouth Bass, NOP-Northern Pike, WAE-Walleye, BLG-Bluegill, SMB-Smallmouth Bass, GSF-Green Sunfish, GOS-Golden Shiner, ROB-Rock Bass